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KLAUBER & JACKSON
411 HACKENSACK AVENUE
HACKENSACK, NJ 07601

EXAMINER

VIUONG, QUOCHUEN B

ART UNIT	PAPER NUMBER
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2618

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/731,693

Applicant(s)

BAR-NESS ET AL.

Examiner

Quochien B. Vuong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: it is not clear what is the MMSE, in the specification, page 2, lines 16-17, states "MMSE (minimum mean squared equalization)", but claims 1 and 3 recite "MMSE equalization". So does MMSE stand for "minimum mean squared equalization" or "minimum mean square error"? If it is "minimum mean squared equalization", then the claims 1 and 3 do not need the word "equalization" following "MMSE".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-5 recite the limitation "**the null subcarrier set S_N** " in claim 1, line 3.

There is insufficient antecedent basis for this limitation in the claim.

Claims 1-5 recite the limitation "**the OFDM signal**" in claim 1, lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

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Claims 1-5 recite the limitation "**the pilot subcarrier set S_p** " in claim 1, line 4.

There is insufficient antecedent basis for this limitation in the claim.

Claims 1-5 recite the limitation "**the data subcarrier set S_D** " in claim 1, lines 6-7.

There is insufficient antecedent basis for this limitation in the claim.

Claims 2-5 recite the limitation "**the data stream**" in claim 2, line 1. There is insufficient antecedent basis for this limitation in the claim.

Claims 3-5 recite the limitation "**the said pilot subcarrier set S_p is taken from MMSE equalization as a first decision**" in claim 3, lines 1-2; while claim 1 recites "**the pilot subcarrier set S_p extracted from the OFDM signal**". There is a conflict between the two claims.

Claims 4-5 recite the limitation "**the equalizer coefficients for N samples**" in claim 4, line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites the limitation "**the unknown parameters in the equalizer coefficients**" in claim 4, lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim 6 recites the limitation "**all transmitted symbols are subjected to said method**" in claim 6, line 1. There is insufficient antecedent basis for this limitation in the claim. In addition, it is not clear what method the transmitted symbols are subjected to.

In view of the 112, 2nd paragraph rejection above, all the claims have been interpreted as best understood by the examiner.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 6 is rejected under 35 U.S.C. 102(e) as being anticipated by Sayeed (US 6,594,320).

Regarding claim 6, Sayeed discloses a method wherein all transmitted symbols are subjected to a method (column 5, lines 6-18).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga et al. (US Pub. No. 2003/0185147) in view of Frank et al. (US 6,956,893).

Regarding claim 1, Taga et al. (figures 2, 3, and 7) disclose a method for phase noise suppression in a receiver section of an OFDM based WLAN operating in accordance with IEEE standard 802.11 a, comprising: estimating ICI plus noise from the

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null subcarrier set S_N extracted from the OFDM signal, and estimating CPE from the pilot subcarrier set S_p extracted from the OFDM signal; and applying the said estimates in MMSE equalization and data detection of the data subcarrier set S_D (paragraphs [0023] – [0037], and [0047]–[0055]). Taga et al. do not disclose the equalization is a MMSE. However, MMSE is well known in the art as taught by Frank et al. (column 3, line 34 – column 5, line 35). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the MMSE equalization of Frank et al. to the equalization of Taga et al. in order to do parallel interference cancellation to significantly increase the performance.

Regarding claim 2, Taga et al. wherein the data stream from RF down conversion and A/D conversion of the OFDM signal is fed as parallel streams for FFT, both CPE and ICI being present at the output of FFT due to phase noise, and said estimates being obtained from said FFT output (paragraphs [0047]–[0055] and figure 7).

Regarding claim 3, Taga et al. (figure 8) disclose wherein the said pilot subcarrier set S_p is taken from MMSE equalization as a first decision and fed back for further CPE estimation to thereby further improve the CPE estimate which proceeds for MMSE equalization and data detection (paragraphs [0057]–[0070]).

Allowable Subject Matter

8. Claims 4 and 5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Regarding claim 4, Taga et al. and Frank et al. disclose the method of claim 3 above, however, Taga et al. and Frank et al. fail to further disclose the method above wherein the estimates are used to calculate the equalizer coefficients for N samples of each transmitted symbol of the OFDM signal.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Crawford (US 6,549,561) discloses OFDM pilot tone tracking for wireless LAN.

Kadous et al. (US 6,654,408) disclose method and system for multi-carrier multiple access reception in the presence of imperfection.

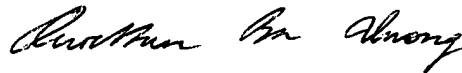
Wang et al. (US 7,012,882) disclose channel estimator for OFDM.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quochien B. Vuong whose telephone number is (571) 272-7902. The examiner can normally be reached on M-F 9:30-18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



QUOCHIE B. VUONG
PATENT EXAMINER

Quochien B. Vuong
Feb. 19, 2007.